the widths of the first gate electrode **120** and the second gate electrode **220** may increase and the widths of the fourth gate electrode **420** and the fifth gate electrode **520** may be substantially constant with increasing distance from the upper surface of the substrate **100**.

[0302] FIGS. **20**A and **20**B are cross-sectional views taken along lines XVII-A-XVII-A' and XVII-D-XVII-D' of FIG. **16**, according to an example embodiment. FIG. **21** is a view schematically illustrating a concentration profile of an element semiconductor material within a first interlayer insulating layer and a second interlayer insulating layer. For convenience of explanation, differences that are not explained above with reference to FIGS. **16**, **17**A and **17**B will be mainly explained below.

[0303] For reference, the graph (a) of FIG. **21** represents a concentration profile of the element semiconductor material in the first interlayer insulating layer **180**, and the graph (b) of FIG. **21** represents a concentration profile of the element semiconductor material in the second interlayer insulating layer **480**.

[0304] Referring to FIGS. **20**A, **20**B, and **21**, in a semiconductor device according to the present example embodiments, the second interlayer insulating layer **480** may include an upper portion **480***b* including an element semiconductor material, and a lower portion **480***a* not including an element semiconductor material. The first interlayer insulating layer **180** may include the upper portion **180***b* including an element semiconductor material, and the lower portion **180***a* not including an element semiconductor material.

[0305] For example, a thickness of the upper portion **180***b* of the first interlayer insulating layer including the element semiconductor material and a thickness of the upper portion **480***b* of the second interlayer insulating layer may be substantially same.

[0306] The amount of element semiconductor material included in the upper portion **180***b* of the first interlayer insulating layer may be different from the amount of element semiconductor material included in the upper portion **480***b* of the second interlayer insulating layer. For example, the amount of element semiconductor material included in the upper portion **180***b* of the first interlayer insulating layer may be less than the amount of element semiconductor material included in the upper portion **480***b* of the second interlayer insulating layer.

[0307] Because the thickness of the upper portion **480***b* of the second interlayer insulating layer and the thickness of the upper portion **180***b* of the first interlayer insulating layer are substantially same, the volume of the upper portion **480***b* of the second interlayer insulating layer and the volume of the upper portion **180***b* of the first interlayer insulating layer may be same.

[0308] Because the amount of element semiconductor material included in the upper portion **480***b* of the second interlayer insulating layer is greater than the amount of element semiconductor material included in the upper portion **180***b* of the first interlayer insulating layer, the upper portion **480***b* of the second interlayer insulating layer may have a greater compressive stress characteristic than the upper portion **180***b* of the first interlayer insulating layer.

[0309] Accordingly, the force with which the second interlayer insulating layer **480** pushes the fourth gate spacers **431**, **432** may be greater than the force with which the first interlayer insulating layer **180** pushes the first gate spacers **131**, **132**.

[0310] Accordingly, the widths of the first trench **121** and the second trench **221** may be substantially constant and the widths of the fourth trench **421** and the fifth trench **521** may decrease with increasing distance from the upper surface of the substrate **100**. Further, the widths of the first gate electrode **120** and the second gate electrode **220** may be substantially constant and the widths of the fourth gate electrode **420** and the fifth gate electrode **520** may decrease with increasing distance from the upper surface of the substrate **100**.

[0311] Therefore, the sign of the slope of the sidewall of the first trench **121** in the first region I may be different from the sign of the slope of the sidewall of the fourth trench **421** in the second region II.

[0312] FIGS. **22**A and **22**B are cross-sectional views of a semiconductor device taken along lines XVII-A-XVII-A' and XVII-D-XVII-D' of FIG. **16**, according to an example embodiment. For convenience of explanation, differences that are not explained above with reference to FIGS. **16** and **17** will be mainly explained below.

[0313] Referring to FIGS. **22**A and **22**B, in a semiconductor device according to the present example embodiment, the distance S**1** between the first gate electrode **120** and the second gate electrode **220** may be different from the distance S**3** between the fourth gate electrode **420** and the fifth gate electrode **520**.

[0314] For example, the distance S**1** between the first gate electrode **120** and the second gate electrode **220** may be less than the distance S**3** between the fourth gate electrode **420** and the fifth gate electrode **520**.

[0315] The first interlayer insulating layer **180** may include the upper portion **180***b* including an element semiconductor material, and the lower portion **180***a* not including an element semiconductor material. Further, the second interlayer insulating layer **480** may include an upper portion **480***b* including an element semiconductor material, and a lower portion **480***a* not including an element semiconductor material. For example, the thickness t**1** of the upper portion **180***b* of the first interlayer insulating layer including the element semiconductor material and the thickness t**2** of the upper portion **480***b* of the second interlayer insulating layer may be substantially same.

[0316] The concentration profile of the element semiconductor material included in the second interlayer insulating layer **480** may be the same as or similar to the concentration profile of the element semiconductor material included in the first interlayer insulating layer **180**.

[0317] In such case, because the distance S**1** between the first gate electrode **120** and the second gate electrode **220** is smaller than the distance S**3** between the fourth gate electrode **420** and the fifth gate electrode **520**, the volume of the upper portion **480***b* of the second interlayer insulating layer may be greater than the volume of the upper portion **180***b* of the first interlayer insulating layer.

[0318] Accordingly, the force with which the second interlayer insulating layer **480** pushes the fourth gate spacers **431**, **432** may be greater than the force with which the first interlayer insulating layer **180** pushes the first gate spacers **131**, **132**.

[0319] Accordingly, the widths of the first trench **121** and the second trench **221** may be substantially constant and the